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ABSTRACT

The purpose of this study was to compare the effects of two cooperative computer-assisted language learning (CALL) environments--face-to-face and distance cooperative CALL--on learners' spelling performance and learning attitude. Traditional classroom lecture learning and self-directed CALL environments were employed as control groups. Learning performance and learning attitude, including interpersonal relationships, learning interests, and self-esteem, were the dependent variables. Sixty-four seventh graders from a local public junior high school were randomly assigned to four treatments. A 10-day experiment was conducted with one 30-minute learning session each day. No significant group differences were found in any dimension of attitudinal measures. Significant performance differences were revealed among the different learning environments. Plausible explanations include: (1) there may exist a threshold for accumulated learning performance to be significant, and the eight-day learning task may not be long enough to achieve this threshold; (2) the amount of various active learning time may contribute to learning performance; and (3) the actual cooperative level may vary. (Contains 33 references.) (AEF)

The EFFECTS of TRAINING METHOD on LANGUAGE LEARNING PERFORMANCE

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Abstract: The purpose of the present study was to compare the effects of two cooperative computer-assisted language learning (CALL) environments on learners' spelling performance and learning attitude. The two cooperative CALL environments are face-to-face and distance cooperative CALL environments. Traditional classroom lecture learning environment and self-directed CALL environment are employed as control groups. Learning performance and learning attitude, including interpersonal relationships, learning interests, and self-esteem, were the dependent variables.

64 seventh graders from a local public junior high school were randomly assigned to four treatments. An experiment was conducted for data collection. The experiment lasted for ten days with a thirty-minute learning session on each day. It was found that there were significant performance differences among learning environments. No significant group differences were found in any dimension of attitudinal measures. Plausible explanations about the findings are provided and future implications follow.

1. INTRODUCTION

The use of computer-assisted learning (CAL) in various pedagogical settings is rapidly increasing. Researchers have reported CAL to be effective in many training situations. Its applications on language learning, for example, has been verified that it can enhance learners' language learning. Many of the CALs are based on a system-driven design and are used as an aid for self-directed study.

Recently, one of the research lines in CAL is the remote (distance) learning through educational network (Hoppe et al. 1994), that may be attributed to the relative novelty of the rapidly evolving network technology. Multi-user telecommunication-enabled cooperative learning environment on CAL becomes feasible in many pedagogical applications (Alavi 1994; Lin 1992). In addition, with the rapid growth of related technology and dropping of hardware prices, multimedia applications are receiving considerable worldwide attention within the field of instructional technology. By accessing and integrating versatile information, such as video, sound, image, and text, multimedia applications in education afford a great potential in improving teaching quality.

2. LITERATURE REVIEW

This section reviews literature on (1) cooperative learning environment, (2) self-directed learning environment, (3) CALL, (4) cooperative CALL environment and distance cooperative CAL environment.

2.1 COOPERATIVE LEARNING ENVIRONMENT

It was argued that learning environment with various degrees of social context would affect learners' learning motives, which, in turn, will have differential effects on learners' performance (Berlyne 1978). The origin of cooperative learning can be traced far back to the ancient Rome Times (Hooper, 1992). Slavin (1983) employed behavior, task structure, motivation, and incentive structure to define cooperative learning. Researchers proclaimed that under cooperative learning context, a learner can make a contribution to another learner's both cognitive and emotional consequences by providing hints, advice, feedback, correction, evaluation, and encouragement. Table 1 showed a summary on it.

Researcher(s)	Year	Type	Performance	Attitudinal Measures
Sharan	1980	I	Better learning performance	
Johnson et al	1981	M	Better learning performance	
Bryant	1982	I	Conceptual change	
Slavin	1983	M	Favored low-achievers	Improved relationships among different racial students
Scott	1974	I	No significant differences	Better attitude to schooling
Johnson et al	1985	I	1.Better than other types of learning 2.Improved problem solving	Enhanced interaction among various abilities students
Yager	1985	I	1.Better learning transfer	1.Higher learners interaction
Yager, et al	1986	I	2.Better long-term retention 3.Better learning performance	2.Better attitude towards others 3.Improved self-esteem

Brown & Reeve	1987		Benefits of members' combined knowledge and shared expertise	
Slavin	1987	I	Significant at elementary level	
Dalton et al.	1989	I	Better performance	
Chang	1990	I	Superior to self-directed learning	Feel bored about learning tasks
Hooper et al	1993	I	better learning outcome	

*: In the 3rd column, "I" represents an individual study and "M" represents a meta study.

Table 1. The Effects of Cooperative Learning on Performance and attitudinal measures.

In the cooperative learning, group members share a variety of thinking roles. Research results indicated that in group setting, peers are important models for their age-mates. In a cooperative learning environment, peers serve as effective tutors and cooperators. In other cases, they can also serve as good or bad examples (Piaget 1965), they can learn through social contact with peers to shape or correct his/her logical structure. Piaget (1965) suggested that the exposure to social context by peer interactions is a valuable experience and provides precious asset to learners in shaping internal cognitive structures. He indicated that peer interaction can offer three advantages in individual's learning process. Firstly, the different point views brought from peer interactions provide the learner an opportunity to experience cognitive conflicts. Secondly, through the process of adjusting with cognitive conflicts, the learner will become less-egocentrism in developing cognitive structure. Thirdly, The internal state of disequilibrium resulted from cognitive conflicts, which is one of the most important factors in affecting the learner's self-identity formulation, will be gradually resolved under his/her subsequent knowledge re-organization.

From the literature review, the advantages of cooperative learning environment can be summed up as follows: 1. Improving learners' social relationship, 2. Stimulating peer interaction, 3. Increasing confidence and self-esteem, and 4. Enhancing learning performance.

2.2 SELF-DIRECTED LEARNING ENVIRONMENT

Although theories of social learning have gained more and more emphasis in educational psychology, self-directed learning theory does play a valuable role in explaining learning process. It is difficult to explain human beings learning process merely by self-directed learning theories or by social-learning theories alone. Brown and Reeve (1987) and Gelman and Brown (1985b) suggested that a coordination of the two extremes, self-directed and social learning, comes somewhat nearer the truth

Self-directed learning environment is defined as an user-controlled independent learning environment. Under such environment, learning performance is subject to the extent to which a learner can direct his/her own learning process independently (Shyu & Brown 1992). Gelman and Brown (1985a,b) pointed out that self-directed learning is guided by systems of internal structure, principles, or constraints that seek support in the environment for their growth and development. They also indicated that human beings come equipped with a tendency to navigate the world by systematically monitoring the results of their own active experimentation with the surroundings. Developmental psychologists support that learning is happened by self-driven motives to explore the outside uncertainty and results in knowledge extension.

Studies have suggested that by providing students self-directed learning environment, learners can better learn how to learn (Merrill 1975). Lepper (1985) indicated that in self-directed learning environment, individuals feel the learning activity has greater personal meaning and intrinsic interests. In the self-directed CAL environment, learners are given control to decide their own learning pace, sequencing, and difficulty levels. In Papert's study with LOGO (1980), it was found that increasing control enhances learners' feelings of self-efficacy.

2.3. COMPUTER ASSISTED LANGUAGE LEARNING (CALL)

The effects of computer assisted language learning (CALL) were often contrasted to that of traditional classroom learning. A literature review on comparing the learning performance in CALL with that in classroom lecture was summarized by Lin (1992) and found that in overall, CALL obtained better learning performance.

2.4 COOPERATIVE CALL ENVIRONMENT

In the cooperative CALL context, Okamoto (1994) analyzed the interaction among learners in a group-type learning situation, and emphasized the importance of interaction such as discussion, collaboration, and competition between learners. He insisted that such interaction promote efficiency in their understanding and confirmation. From literature review, it is generally acknowledged that cooperative task based learning is an appropriate paradigm for foreign language teaching. Foubister et al. (1996) found members in group setting share a variety of thinking roles and enhance communication skills. Traditional CALL environment is self-directed which may constrain learners' social interaction with peers and teachers and thereby result in a poor social relationship. As to the impacts of distance cooperative CAL learning environment, Alavi (1994) found that students in such group obtained significantly higher performance and better experience.

2.5 RESEARCH GOALS

In the present study, an experiment was conducted to explore possible learning differences between face-to-face cooperative CALL environment and distance cooperative CALL environment. The self-directed CALL environment and the traditional classroom lecture learning environment were employed as the control groups. The target system is an English spelling lesson for seventh grade pupils.

3. RESEARCH METHODOLOGY

A 10-day experiment with 8-session learning units was conducted for data collection. The material covered in the learning unit is English words spelling task. 100 of seventh graders were randomly chosen from a public junior high school at a northern city in Taiwan, ROC. An English vocabulary spelling pretest was administered to screen out the students with top and bottom scores. After the pretest, 64 students were chosen to participate the study and were then randomly assigned to four groups..

3.1 PROCEDURE

The classroom lecture group took a 30-minute instruction from an English teacher in the morning. Whereas the three CALL groups took the same instruction from CALL system in the afternoon. The different time allocation, which may contribute to possible treatment effects, is due to the limited availability of the computer room. 16 subjects in the two cooperative CALL groups were randomly assigned to form 8 pairs. Individuals in the pairs within the two cooperative CALL groups would daily switch roles as the peer-tutor and the learner.

3.2 RESEARCH VARIABLES

Three types of research variable: independent, dependent, and control, variables were examined. The independent variable was learning environment, including traditional classroom lectures, self-directed CALL, face-to-face cooperative CALL, and distance cooperative CALL. Two dependent variables included in the present study were learning performance and learning attitude. Learning performance was measured by an achievement test. Three dimensions of learning attitude, i.e., interpersonal relationships, learning interests, and confidence, were included in a self-developed learning attitude scale. Two control variables were the learner's prior English spelling achievement and the learner's ability. The former was controlled out by a pretest and the latter was controlled by random sampling.

3.3 RESEARCH HYPOTHESES

The present study is designed to test the superiority of cooperative CAL environment in language learning. The hypotheses to be examined in the present study include:

1. H_0 : There is no difference in learning performance and attitude among four learning environments.
2. H_0 : There is no difference in learning performance and attitude between three CALL groups and traditional classroom lecture learning group.
3. H_0 : There is no difference in learning performance and attitude between two cooperative CALL group and self-directed CALL group.
4. H_0 : There is no difference in learning performance and attitude between distance cooperative CALL group and face-to-face cooperative CALL group.

3.5 RESEARCH INSTRUMENT

Three types of research instrument, including a target system, an attitude scale, and an achievement test, were used in the present study. The target system was developed in Microsoft Windows environment using Visual Basic tools. The target system included two versions: single-user and real time multi-user versions. The former version was for face-to-face cooperative and self-directed CALL environments, and the latter was for distance cooperative CALL environment.

The self-developed attitude scale, synthesized from previous studies (Lin, 1992; Yang, 1989; Konttinen, 1985; Laine, 1977; Gardner & Lambert, 1972), contained 24 questions in the 3 dimensions: interpersonal relations, learning interests, and self-confidence. The attitude scale obtained a moderate split-half reliability coefficient of 0.62 by using Sperman-Brown formula.

The achievement test contained all 36 words taught in the experiment. Group interviews were conducted for data collection about subjects' experiences in using CALL systems. Subjects were asked to rate on the system's features as well its usefulness.

4. STUDY RESULTS AND DISCUSSIONS

One-way ANOVA technique and Sheffe's a posteriori test were employed to analyze data. It was found that there existed significant differences in learning performance among four groups. Sheffe's a posteriori test was employed to test all possible contrasts among the means. It was found that subjects in classroom lecture learning environment outperformed the rest. In addition, the results indicated that there existed significant performance differences among specific groups, namely, classroom lecture, distance cooperative CALL, and face-to-face cooperative CALL learning groups.

Source	DF	Sum of Squares	Mean of Squares	F Value	P
Model	3	403.43	134.48	6.01	0.0012
Error	60	1320.31	22.39		
Total	63	1723.75			

Note: * represents a significance at .01 level.

Table 2. ANOVA Table of Different Learning Environments

	Mean	STD	N	Classroom Lecture	Distance Cooperative CALL	Face-to-Face Cooperative CALL

Classroom Lecture	13.19	6.45	16			
Distance Cooperative CALL	6.44	2.73	16	6.75*		
Face-to-Face Cooperative CALL	8.00	3.02	16	5.19*	-1.56	
Self-Directed CALL	8.56	5.51	16	4.63	-2.12	-0.56

Note: * represents a significance at .05 level.

Table 3. Means, Standard Deviation, and Sheffe's a Posteriori Test

Regarding to the attitudinal differences in three dimensions: interpersonal relations, learning interests, and confidence, it was found no significant group differences existed. Nevertheless, group interview results showed subjects in two cooperative CALL groups expressed highly positive experiences in helping others. A sense of achievement and learning interests were proliferated in those groups during the experiment. Regarding to the target system evaluation, subjects commented the system as "vivid, interesting, well-represented, and user-friendly". They described the learning process is full of happiness and fun.

4.3 DISCUSSIONS

The most astonishing finding in this study is the significant performance differences that favor classroom lecture learning environment. The other three CALL environments did not generate as good performance as classroom lecture learning environment did. Two similar results were found in literature. Firstly, the Plait Report conducted in North Ireland (Hammond, 1994) was to examine if students would do better in homework with the help of a notebook computer at home. After one year's experiment, the results indicated that no significant better performance was found.

Secondly, the ImpacT Report (Hammond 1994), a longitudinal study conducted in England, indicated two important findings in explaining the insignificant outcomes in the cooperative group. First, the degree that learners actually cooperate was a critical factor of learner's performance. Second, there may exist a threshold for cooperative learning to be effective. In other words, learning outcome needs to be accumulated to pass over a "threshold" to be significant.

After a close examination on the research design and experiment procedure, three plausible explanations to the study results are drawn.

1. Although total learning time was the same across groups, the time allocated to active learning varied. Students in three CALL groups needed to spend sometime in adjusting to the CALL environment. The actual learning time for CALL groups would be less than that in the classroom lecture group and that might result in inferior performance in the CALL groups.
2. Although the quality of spelling lesson was manipulated to be identical across groups, the active learning time in doing spelling exercise varied. Subjects in the classroom lecture and self-directed CALL groups did the spelling exercise all by themselves, which would take a longer active learning time. Whereas in the two cooperative groups, due to the daily peer-tutor vs learner role change, subjects only spelled half of the words in the spelling exercise on average. This might significantly reduce the active learning time. The two reasons may well explain why the classroom lecture group and the self-directed CALL group obtained the highest two mean achievement scores.
3. Finally, the actual cooperation level may help explaining the performance differences in two cooperative CALL groups. In the face-to-face cooperative CALL group, subjects seated next to each other and therefore could cooperate more effectively. In the distance cooperative CALL group, subjects helped each other via microphone communication, which is more time-consuming. When exposed in a time constraint situation, the above different patterns may contribute to the quality of cooperation and result in inferior performance in the distance cooperative CALL group. The fact that distance cooperative CALL group obtained the lowest achievement scores was not surprising.

5. CONCLUSION AND IMPLICATION

Researches of the learning environment effects on learning performance and on motivation have been a lot, the results are not consistent - some are even contradictory. How to choose representative learning models with significant factors is still a big challenge. This study outlines a research in examining the possible environmental effects on learning performance and on learning attitude. Research results suggest significant performance differences exist among different learning environments. Plausible explanations to the differences include: 1. There may exist a threshold for accumulated learning performance to be significant. The 8-day learning task may not be long enough to achieve the threshold. 2. The amount of various active learning time may contribute to learning performance. 3. The actual cooperation level may vary. Other plausible explanation may be that the cognitive complexity of the English word spelling task is not suited for cooperative learning.

In order to acquire a more complete picture on the effects of learning environment on learners, it is suggested to revise the system based on the subjects' comments and replicate the study with a larger sample. It is also suggested that another learning task with higher level of cognitive complexity be employed. In addition, a complete instruction should be given to the CALL groups before the study to ensure subjects acquire the computer skills prerequisites.

By building up such a distance social learning environment with multimedia support, it is the researcher's hope to provide a

prototype for futuristic learning environment and bring impacts on education revolution in the coming centuries.

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